

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Robert BENNETT

Application No.:

Group Art Unit:

Filed: September 29, 2003

Examiner:

For: GRIPPING MEMBERS GRIPPING AND MOVING PACKETS STACKED BY A
CONVEYOR

**SUBMISSION OF CERTIFIED COPY OF PRIOR FOREIGN
APPLICATION IN ACCORDANCE
WITH THE REQUIREMENTS OF 37 C.F.R. § 1.55**

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 C.F.R. § 1.55, the applicant(s) submit(s)
herewith a certified copy of the following foreign application:

Great Britain Patent Application No(s). 0222626.4

Filed: September 30, 2002

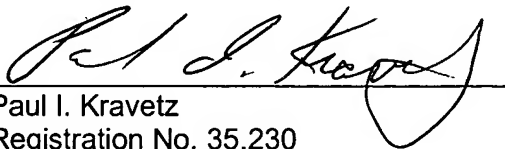
It is respectfully requested that the applicant(s) be given the benefit of the foreign filing
date(s) as evidenced by the certified papers attached hereto, in accordance with the
requirements of 35 U.S.C. § 119.

Respectfully submitted,

STAAS & HALSEY LLP

Date: September 29, 2003

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INVESTOR IN PEOPLE

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The Patent Office

Cardiff Road
Newport
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NP9 1RH

1. Your reference

RSJ07596GB

2. Patent application number

(The Patent Office will fill in this part)

0222626.4

3. Full name, address and postcode of the or of each applicant (*underline all surnames*)

Ishida Europe Limited
11 Kettles Wood Drive
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B32 3DB, Great Britain

Patents ADP number (*if you know it*)

6758924002

If the applicant is a corporate body, give the country/state of its incorporation

Great Britain

30 SEP 2002

4. Title of the invention

ITEM HANDLING METHOD AND APPARATUS

5. Name of your agent (*if you have one*)

Gill Jennings & Every

"Address for service" in the United Kingdom to which all correspondence should be sent (*including the postcode*)

Broadgate House
7 Eldon Street
London
EC2M 7LH

Patents ADP number (*if you know it*)

745002 /

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (*if you know it*) the or each application number

Country

Priority application number
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Date of filing
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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (*Answer 'Yes' if:*

YES

a) *any applicant named in part 3 is not an inventor, or*

b) *there is an inventor who is not named as an*

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See note (d))

Patents Form 1/77

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Description 6

Claim(s) 2

Abstract

Drawing(s) 2

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Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

NO

11. For the applicant
Gill Jennings & Every

I/We request the grant of a patent on the basis of this application.

Signature

Date

30 September 2002

12. Name and daytime telephone number of person to contact in the United Kingdom

R.E. Skone James

020 7377 1377

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ITEM HANDLING METHOD AND APPARATUS

This invention relates to a method and apparatus for handling items and specifically to a method and apparatus
5 for removing collated stacks of items from the end of a production line.

A system for collating items on a production line is described in our British Patent Application No. 0208389.7. This system has an in-feed conveyor and a stacking conveyor
10 on which discrete stacks of collated items are formed. The in-feed conveyor runs at a constant speed and has a photodetector associated with it which detects the position of items on the in-feed conveyor. This allows a computer to determine when the items will reach the end of the in-
15 feed conveyor and fall onto the stacking conveyor. The computer is then able to control the motion of the stacking conveyor such that it decelerates just as the item leaves the in-feed conveyor, thereby allowing the item to land in a controlled fashion at a known location. The risk of the
20 item bouncing or skidding is reduced by using a high friction conveyor material.

Typically, this type of collating system is used to stack packets of snack products, such as crisps, before they are finally packaged into a cardboard box. The
25 individual stacks are conventionally removed from the stacking conveyor by a vacuum head which places them into the cardboard box on an adjacent conveyor.

A disadvantage of this is that the vacuum head can only remove items such as crisp packets when they are in a
30 laid down configuration. However, it is becoming increasingly desirable to package such packets in a standing up configuration since this prevents damage to the product during long distance haulage. As such, there exists a need for a system that can remove items from the
35 end of a production line and package them in a standing up configuration.

According to the present invention, there is provided apparatus for handling items comprising an item supply system for supplying items to a stacking location; and a gripping system having at least one pair of independently mounted and movable gripper assemblies, each having at least one gripper member, each gripper member being movable relative to the stacking location; and a control system for causing the gripper members to grip a stack of items therebetween and move the stack of items from the stacking location.

The invention provides a new and versatile method of transferring products from a stacking location. Specifically, the invention allows for items such as crisp packets in a standing up configuration to be gripped.

In a preferred embodiment, the gripper assemblies are mounted on individual endless belts although other arrangements, such as mounting the gripper assemblies on individual hydraulic rams, are possible.

Typically, the gripping system comprises one drive motor for each gripper assembly.

The gripper members are preferably paddles and the gripper members normally have a high friction surface for gripping the items.

Normally, the item supply system comprises an in-feed conveyor and a stacking conveyor for stacking the items in discrete groups.

In accordance with a second aspect of the invention, there is provided a method for handling items, the method comprising supplying items to a stacking location; gripping a stack of items between a pair of gripper members, each of which forms part of a pair of independently mounted and movable gripper assemblies; and, moving the stack of items from the stacking location.

Typically, the gripper members move one discrete stack of items from the stacking location at a time.

Normally, the items are moved to a packing station. In this case, the items are typically moved to the packing

station either by rotating the gripper members or by sliding the gripper members to the packing station.

An embodiment of the invention will now be described with reference to the accompanying drawings, in which:-

5 Figure 1 shows part of a production line for packaging packets of crisps, incorporating a collating system and an embodiment of the invention;

 Figure 2 shows an array of items being gripped by the gripper system;

10 Figure 3 shows the invention being used with a bar conveyor system; and,

 Figure 4 shows a holding cage for use with the invention.

15 Figure 1 shows an in-feed conveyor 1 which leads to an inclined conveyor 2. The in-feed conveyor 1 and inclined conveyor 2 typically run at the same speed. Inclined conveyor 2 is arranged such that its downstream end is at a slightly higher level than a stacking conveyor 3.

20 A photodetector 4 detects items moving along in-feed conveyor 1. Since in-feed conveyor 1 and inclined conveyor 2 run at the same constant speed, it is possible to predict when an item 10, such as a snack food packet, will reach the downstream end of inclined conveyor 2.

25 This calculation is performed by a computer (not shown) that also controls the motion of stacking conveyor 3. In order to stack an array of items on the stacking conveyor 3, the stacking conveyor 3 can be driven at a constant speed slower than the in-feed conveyor 1 and the inclined conveyor 2. The speed of the stacking conveyor 3
30 is chosen such that the total displacement of stacking conveyor 3 between the arrival of each item at the downstream end of inclined conveyor 2 is less than the length of each item.

35 The stacked array of items 11 in this example consists of four items. When this array of items 11 has been produced, the stacking conveyor 3 is accelerated

momentarily such that a gap is produced between the arrays of items.

Alternatively, the stacking conveyor 3 can be driven in a cyclic fashion, in which as the item 10 leaves the downstream end of inclined conveyor 2, the stacking conveyor 3 begins to decelerate, thereby providing controlled braking for item 10.

Stacking conveyor 3 is then accelerated such that item 10 is moved downstream and as the next item leaves the inclined conveyor 2, stacking conveyor 3 begins to decelerate again. The total displacement of stacking conveyor 3 during the acceleration and deceleration cycle is less than the length of each item and so a stacked array of items 11 is produced.

Again, when the array of items 11 has been produced, the stacking conveyor 3 is accelerated momentarily such that a gap is produced between the arrays of items.

Stacking conveyor 3 is also provided with supports 5 which prevent the items from lying flat. Stacking conveyor 3 is positioned such that the first item to form an array will land against a support 5 as it leaves the inclined conveyor 2.

Typically, the stacking conveyor 3 will be the end of a production line and so the array of items 11 must be removed for packing or some other operation. This task is performed by paddles 21a, 21b.

Each paddle 21a, 21b is independently driven on a respective one of a pair of laterally spaced endless belts 20a, 20b and as such can be independently positioned along the length of stacking conveyor 3. The array of items 11 is removed from the stacking conveyor 3 by gripping it between the paddles 21a, 21b.

The paddles 21a, 21b may be driven in a multiplicity of ways in order to grip the array of items 11. For example, paddle 21a may be positioned downstream of array of items 11 and remain stationary until such time as contact is established between the array of items 11 and paddle 21a

and then it may be driven with the same velocity as stacking conveyor 3. Alternatively, paddle 21a may be driven towards the downstream end of array of items 11 until contact is established between the array of items 11 and paddle 21a, when its direction of motion would be reversed and its speed adjusted such that it moved at the same rate as stacking conveyor 3.

Paddle 21b is driven at a faster rate than stacking conveyor 3 until such time as it contacts the upstream end of array of items 11 when it will proceed with the same speed as stacking conveyor 3.

It is possible to detect when the paddles 21a,21b make contact with the array of items 11 in many ways. For example, the paddles 21a,21b may be fitted with optical or mechanical sensors that respond when contact is established with the array of items. Alternatively, it is possible to detect the positions of the array of items 11 and the paddles 21a,21b to establish whether they are in contact.

When the array of items 11 has been gripped between paddles 21a,21b, as shown in Figure 2, it is then removed from stacking conveyor 3. In one example, this is achieved by sliding the entire assembly comprising endless belts 20a,20b and paddles 21a,21b in a direction transverse to the direction of motion of the stacking conveyor 3, such that it is disposed above a packing conveyor (not shown) conveying cardboard boxes. This packing conveyor lies adjacent to and parallel to stacking conveyor 3.

In an alternative arrangement, the array of items 11 is transferred to a bar conveyor system in which each array of items is driven along a conveying surface 30 by bar conveyors 31.

The array of items 11 may be transferred in the same manner as described above by moving the entire gripping assembly such that it lies above the conveying surface 30. However, the items may instead be transferred by rotating the paddles using an elbow joint (not shown) in the paddles, such that they rotate through 90°, thereby

displacing the items to conveying surface 30. Alternatively, this rotational motion may be combined with the translational motion of the entire gripping system already described.

5 The bar conveyor system comprising conveying surface 30 and bar conveyors 31 conveys the array of items 11 for further operations to be performed upon it. For example, the array of items 11 may be conveyed to a bagging machine (not shown) which seals the array of items 11 in a bag.

10 In another alternative arrangement, the array of items 11 can be carried by the paddles 21a, 21b beyond the downstream end of stacking conveyor 3 and released into a container, such as a cardboard box, or onto a further conveyor system.

15 Figure 4 shows a further arrangement for removing the array of items 11 from the paddles 21a, 21b. In particular a holding cage 40 is shown which comprises four support poles 41a to 41d. These support poles 41a to 41d are movable between a receiving position (shown in solid lines) and a delivering position (shown in dashed lines).

20 In the receiving position, the array of items 11 is positioned on the holding cage 40 and released there such that the array of items 11 is then supported by the support poles 41a to 41d. When the paddles 21a, 21b have released
25 the array of items 11, the holding cage 40 is rotated into the position shown in dashed lines, thereby transferring the array of items 11 to conveying surface 30.

CLAIMS

1. Apparatus for handling items comprising an item supply system for supplying items to a stacking location; and a gripping system having at least one pair of independently mounted and movable gripper assemblies, each having at least one gripper member, each gripper member being movable relative to the stacking location; and a control system for causing the gripper members to grip a stack of items therebetween and move the stack of items from the stacking location.
 2. Apparatus according to claim 1, wherein each of the gripper assemblies is mounted on an individual endless belt.
 3. Apparatus according to either of the preceding claims, wherein the gripping system comprises one drive motor for each gripper assembly.
 4. Apparatus according to any of the preceding claims, wherein the gripper members are paddles.
 5. Apparatus according to any of the preceding claims, wherein the gripper members have a high friction surface for gripping the items.
 6. Apparatus according to any of the preceding claims, wherein the item supply system comprises an in-feed conveyor and a stacking conveyor for stacking the items in discrete groups.
 7. A method for handling items, the method comprising supplying items to a stacking location; gripping a stack of items between a pair of gripper members, each of which forms part of a pair of independently mounted and movable gripper assemblies; and, moving the stack of items from the stacking location.
 8. A method according to claim 7, wherein the gripper members move one discrete stack of items from the stacking location at a time.
 9. A method according to either claim 7 or claim 8, wherein the items are moved to a packing station.
-

10. A method according to claim 9, wherein the items are moved to the packing station by rotating the gripper members.
 - 5 11. A method according to claim 9, wherein the items are moved to the stacking station by sliding the gripper assemblies to the packing station.
 12. Apparatus substantially as hereinbefore described with reference to the accompanying drawings.
 - 10 13. A method substantially as hereinbefore described with reference to the accompanying drawings.
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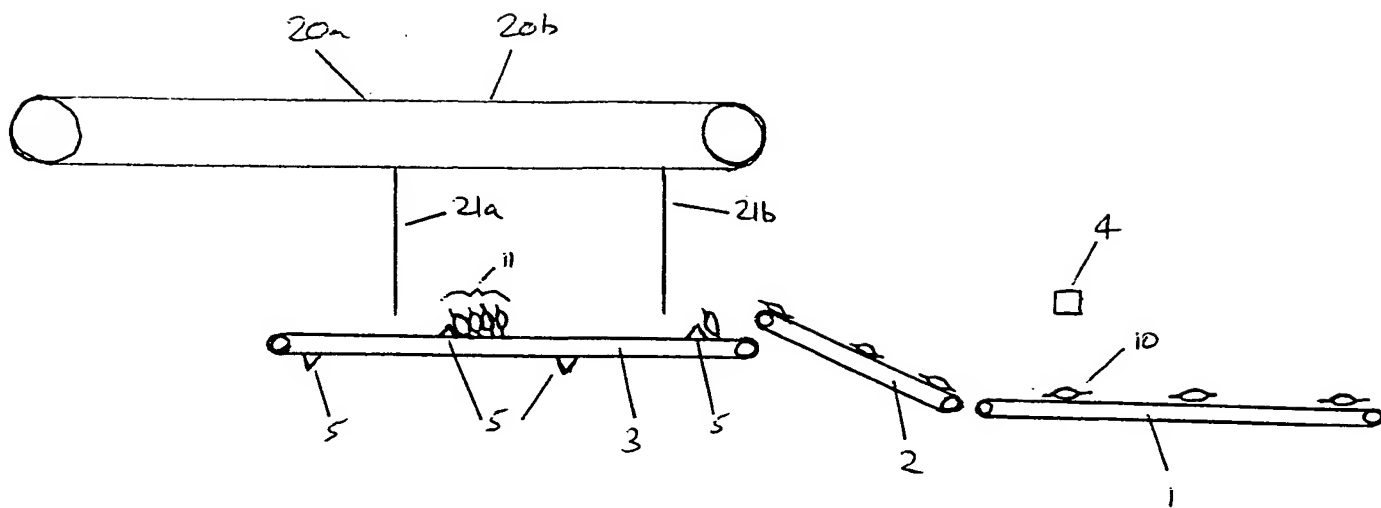


Fig. 1

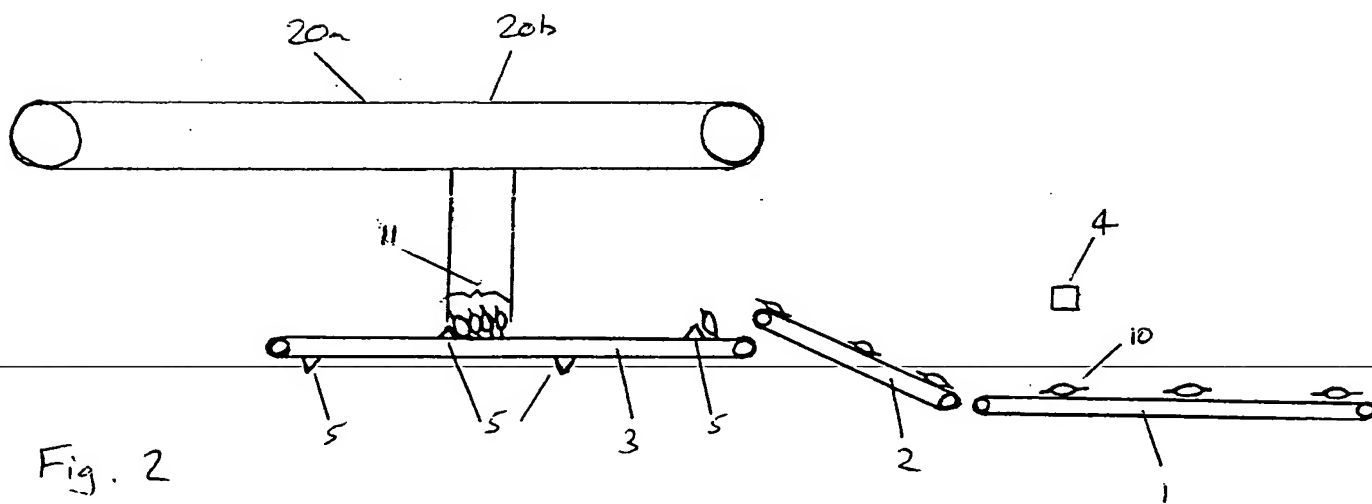


Fig. 2

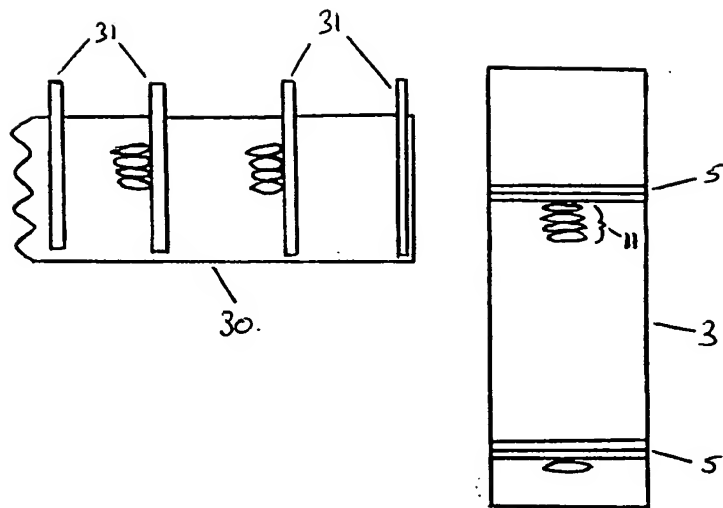


Fig. 3

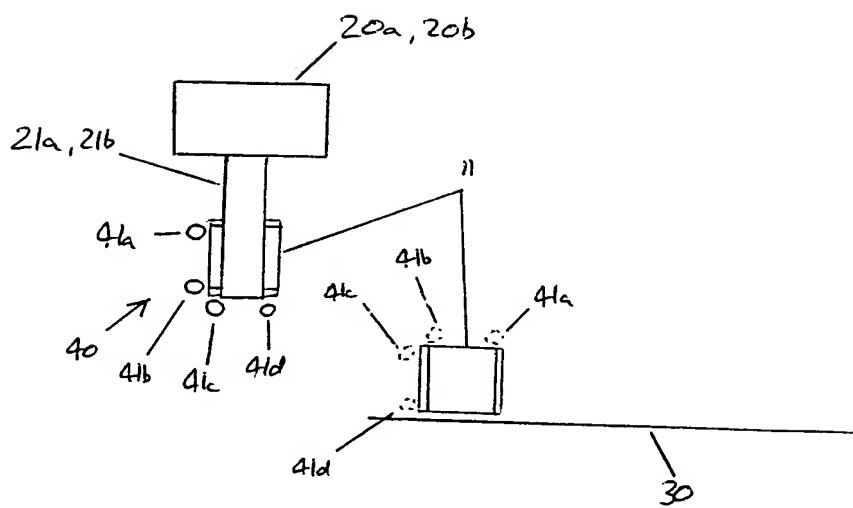


Fig. 4